

Remarks

Upon entry of this Amendment, claims 1, 3-8 & 11-24 will be pending. Claim 2 was canceled by a Preliminary Amendment. Claims 9 and 10 will be canceled upon entry of the present Amendment, their limitations having been added to claim 1. Re-examination and reconsideration are respectfully requested.

The dependency of claim 3 has been changed so that it now incorporates the limitations of claim 1. Claims 4-8 depend directly or indirectly from claim 1. They now satisfy the requirements of 35 U.S.C. § 112, ¶ 2.

Claims 1, 3, 9 & 19-24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Sonoda et al. U.S. Patent No. 4,874,480 (the '480 patent).

As amended, claim 1 now incorporates limitations of claims 9 and 10, which are lacking in Sonoda et al. Accordingly, claim 1 cannot be anticipated thereby. As amended, claim 3 depends from claim 1 and rises or falls therewith. Claim 9 is canceled.

Claim 19 incorporates the limitations of claim 1 and rises or falls therewith.

In claim 22, step (I)(C) calls for:

“at least one dissolved auxiliary acid other than phosphoric acid, the auxiliary acid being present in an amount of at least 30 g/l and having at least a first ionization constant that is greater than the third ionization constant for phosphoric acid; and, optionally, other constituents as further below, . . .”

The Examiner states that Col. 2, ll. 18-34 of Sonoda et al. meets the (corresponding) limitation of claim 1.

However, that reference teaches:

“The acidic zinc phosphate electrolytic conversion coating solution used in this invention is an aqueous solution in which zinc phosphate is a critical component. The zinc ion concentration is maintained between 1 to 50 g/l, and preferably 5 to 20 g/l; and the phosphate ion concentration (as PO_4^{3-}) is maintained between 3 to 140 g/l, and preferably 10 to 60 g/l. Calcium, manganese and iron ions can be added to the bath as well as zinc ions, and it is possible to form a composite film of zinc and such materials.”

Accordingly, it cannot be said that the invention as defined in claim 22 is anticipated by the cited reference.

Claims 23 and 24 rise or fall therewith.

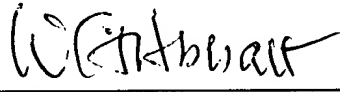
In the Office Action on page 4, claims 4-8 and 10-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sonoda et al. as applied to claims 1, 3, 9, and 19-24 above, and further in view of Shimaura et al. '640 and Witte ('352).

Claim 4 incorporates the limitations of claims 3 and 1. The discussion of claim 1 as amended is incorporated herein by reference. Similarly, for claims 5-8. Claim 10 is canceled. The dependency of claim 11 has been changed so that it now depends from claim 1. Claims 12-18 depend from and incorporate the limitations of claim 1. The differences between claim 1 and Sonoda et al. made above are incorporated here by reference.

All formal and substantive requirements for patentability now appear to have been met. Accordingly, it is appropriate to request a Notice of Allowance. If a telephone conference would expedite prosecution, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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Attachment

VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Twice Amended) A process for forming a lubricative film for cold working on a metal substrate, said process comprising the following operations:

(I) bringing said metal substrate into contact with an aqueous electrolyte solution comprising water and:

(A) at least 20 g/l of dissolved zinc cations;

(B) at least 20 g/l of dissolved phosphate anions; and

(C) at least one dissolved auxiliary acid other than phosphoric acid, said auxiliary acid having at least a first ionization constant that is greater than the third ionization constant for phosphoric acid; and, optionally, other constituents as detailed further below,

this aqueous electrolyte also being in contact with a counter-electrode that is not said metal substrate to be cold worked, so that an electric current can pass through the counter-electrode as anode, the aqueous electrolyte solution by ionic conduction, and said metal substrate as cathode;

(II) passing through said metal substrate while it remains in contact with said aqueous electrolyte solution an electric current that has a net cathodizing character at said metal substrate for a sufficient time to form an adherent solid phosphate conversion coating over said metal substrate;

(III) discontinuing contact between said aqueous electrolyte solution and said metal substrate bearing said adherent solid phosphate conversion coating; and

(IV) applying to the exterior surface of said solid phosphate conversion coating, when it is not in contact with said aqueous electrolyte solution, a water- or oil-based lubricant coating,

[wherein said aqueous electrolyte solution in operation (I):

comprises at least 20 g/l of dissolved zinc cations and at least 20 g/l of dissolved phosphate anions; and]

[has] the aqueous electrolyte solution having a pH value at least as low as the pH value of a hypothetical reference electrolyte solution that contains the same actual amounts of dissolved zinc and phosphate ions as does said aqueous electrolyte solution and in addition contains at least 30 g/l of nitric acid as its only auxiliary acid[.] ;

at least one type of divalent or trivalent metal ions selected from a group consisting of magnesium, aluminum, calcium, manganese, chromium, iron, nickel, and copper; and

a concentration of calcium ions such that the molar ratio of calcium ions to zinc ions is from 0.1:1 to 2:1.

3. (Amended) A process according to claim [2] 1, wherein said aqueous electrolyte solution additionally comprises at least one type of divalent or trivalent metal ions selected from the group consisting of magnesium, aluminum, calcium, manganese, chromium, iron, nickel, and copper.

11. (Amended) A process according to claim [10] 1, wherein before operation (I), said substrate is acid pickled and then rinsed with water.